RTU32M Data Sheet

Brodersen Modular RTU

Data Sheet

June 2019

BRODERSEN

simplifying systems

Contents

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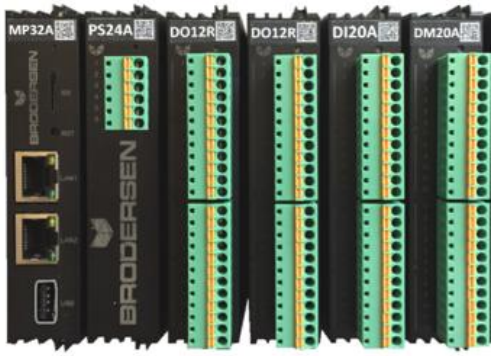
INTRODUCTION TO RTU32M



Brodersen Modular RTU32M Series with advanced RTU/PLC functionality.

The RTU32M series is based on an embedded 32-bit industrial platform providing flexible RTU functionality for a wide range of remote monitoring and control applications in the utility and infrastructure markets.

Each RTU32M comprises of a CPU module, power supply module and the desired mix of IO modules and system modules, as required.

The RTU32M supports a variety of standard and open protocols such as Modbus, IEC60870, IEC61850 and DNP3. It also includes the fast event based Binding protocol - a fast and reliable way to distribute time stamped event data between any Brodersen RTU32M in the network.

The RTU32M has a web server configuration interface for setup of the RTU 'personality' eg. IP address, IO range, Slave address etc. Additional RTU functionality, including logic, messaging and logging are configured in the Brodersen WorkSuite.

Each module is housed in a robust plastic enclosure suitable for DIN rail mounting. The RTU32M modules are 110mmH, 25mmW and 110mmD.

The RTU32M power supply module operates from 10-30VDC. The local IO bus supports up to 250 I/O modules.

FEATURE LIST

- Modular RTU with or without integrated I/O and communication device.
- Reliable Real Time Operating System.
- Communication Protocols Supported;
  - Full Modbus suite.
  - IEC60870-5-101/103/104
  - IEC61850 Client / Server Protocol.
  - DNP3 Master and DNP3 Slave.
  - Binding - Global Distribution and Subscription of Event Based Time Stamped Variables.
- Communication Protocols can also be created as part of the logic application interface.
- Communication interfaces; 2 x Ethernet 10/100, 1x USB are featured on the CPU module.
- Full EN/IEC61131 PLC runtime – also used for special and flexible data manipulation.
- Includes power supply monitoring of the RTU32M supply voltage and temperature
- Support for redundant power supplies
- Hot swappable IO.
- Full remote management of configuration, programming and flexible distribution of all levels of software from and to RTUs at remote locations.

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MP32A
CPU – Controller Module

The CPU module speed is managed via the RTU performance license options:

MP32A	200MHz
Upgrade options:	528MHz
	900MHz

The default RAM size is 128MB, a license option allows 256MB for 528/900MHz models

HARDWARE - BASICS

CPU:	ARM Cortex – A7 Freescale i.MX6UL, 200-900 MHz Linux: Yocto
Memory:	RAM: 128-256MB SDRAM NAND Flash: 128MB NVRAM/FRAM: 128KB Option: Micro SD Card Flash disc – removable
RTC:	Integrated and battery backed RealTimeClock with 1 msec resolution
Interfaces:	LAN: 2x 10/100Mbps RJ45 1 x USB 2.0 Host. 1x USB OTG for maintenance and diagnostics (via 5 pin header).

RTU32M PLC RUNTIME

PLC Runtime performance:

Minimum cycle time:	1msec
Typical cycle time:	2-3msec
Maximum PLC variables:	2 x 20kb – calculated as sum of all variables.
Scan time internal I/O:	Min. 2msec

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SP04A
4 Serial Ports (3x 232, 1x 232/485)

The 4 serial port module provides 3x RS232 ports and 1x isolated RS232/485 port.

Type of communication ports:

- 1x Isolated RS232/RS485, configurable
- 2x RS232 with RX, TX, RTS and CTS signals
- 1x RS232 with all null-modem signals

Power consumption: 70mA @ 12V.

Interfaces:

- 1x 3 way connector for Port A
- 2x Dip-switches, for Port A configuration
- 2x RJ12 (6P6C) connector for Ports B and C
- 1x 9-pin mail SUB-D male connector for Port D
- 1x Dual colour LED on front for module status.

Port D (COM4 in a single module setup):
RS232, (full handshake) 9-pin male SUB-D connector, with standard DTE pinout:

Pin 1	DCD
Pin 2	RXD
Pin 3	TXD
Pin 4	DTR
Pin 5	GND
Pin 6	DSR
Pin 7	RTS
Pin 8	CTS
Pin 9	RI

Ports C (COM3) & B (COM2)
RS232, with RJ12 (6P6C) connectors.

Pin 1 (top)	RTS
Pin 2	TXD
Pin 3	GND
Pin 4	GND
Pin 5	RXD
Pin 6	CTS

Port A (COM1 in a single module setup):
Isolated 3 wire RS232 / 2 wire RS485. The mode is configurable via 2x dip-switches.

Pin 1	GND (RS232)
Pin 2	TXD (RS232) / Data+ (RS485)
Pin 3	RXD (RS232) / Data- (RS485)

DSW-2 Mode selection RS485 / RS232 mode
DSW-1 RS485 Mode Termination Resistor

Note: When two SP04A modules are used - the module closest to the CPU will be COM ports 1-4 (A-D), the next module will be COM ports 5-8 (A-D).

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PS24A
Power Supply (10-30V)

Connector

1x 6 way 3.5mm Phoenix MC pluggable screw clamp connector for supply input.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A:

Pin 1: Earth
Pin 2: Earth
Pin 3: + Vin
Pin 4: + Vin
Pin 5: - Vin
Pin 6: - Vin

Module Input Power

Input supply voltage:
10..30 VDC (Vin)

Power consumption:
Max 2 A @ 12V input voltage.
Max 1 A @ 24V input voltage.

Isolation:
1500 VDC input supply voltage to electronics, 1 minute.

Module Output Supply

Output voltage:
12 VDC +- 10% for I/O modules and electronics.

Output current:
Max 1.2 A continuous for I/O modules.

Max 1.7 A overload current limit / short circuit protection.

In case of an overload / short, I/O module power will turn off and retry after approx. 5 sec.

Module input and output voltage and current, are monitored by the CPU, and reported to the RTU at regular intervals.

Power Supply Redundancy

Two (or more) PSU can be inserted next to each other, to provide PSU redundancy. The two PSUs will do simple load sharing.

If the total load is 100%, one PSU will deliver eg. 60%, and the second 40%.

Note: This is for redundancy only. If more than 100% (1.2 A) is needed, a new PSU segment is needed.

Ambient temperature range:
-40°C to +55°C @ 100% load
-40°C to +70°C @ 50% load

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PS48A
Power Supply (30-60V)

Connector

1x 6 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for supply input.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A:

Pin 1: Earth
Pin 2: Earth
Pin 3: + Vin
Pin 4: + Vin
Pin 5: - Vin
Pin 6: - Vin

Module Input Power

Input supply voltage:
30..60 VDC (Vin)

Power consumption:
Max 2 A @ 30V input voltage.
Max 1 A @ 60V input voltage.

Isolation:
1500 VDC input supply voltage to electronics, 1 minute.

Module Output Supply

Output voltage (internal):
12 VDC +- 10% for I/O modules and electronics.

Output current:
Max 1.2 A continuous for I/O modules.

Max 1.7 A overload current limit / short circuit protection.

In case of an overload / short, I/O module power will turn off and retry after approx. 5 sec.

Module input and output voltage and current, are monitored by the CPU, and reported to the RTU at regular intervals.

Power Supply Redundancy

Two (or more) PSU can be inserted next to each other, to provide PSU redundancy. The two PSUs will do simple load sharing.

If the total load is 100%, one PSU will deliver eg. 60%, and the second 40%.

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-40°C to +55°C @ 100% load
-40°C to +70°C @ 50% load

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AI08A
8ch Analog Inputs

This module provides 8x user configurable 16bit analog input channels.

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connectors for IO terminations. One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):

Pin 1:	CH0 V+
Pin 2:	CH0 I-
Pin 3:	CH0 V-
Pin 4:	CH1 V+
Pin 5:	CH1 I-
Pin 6:	CH1 V-
Pin 7:	CH2 V+
Pin 8:	CH2 I-
Pin 9:	CH2 V-
Pin 10:	CH3 V+
Pin 11	CH3 I-
Pin 12:	CH3 V-

Connector B (lower:

Pin 1:	CH4 V+
Pin 2:	CH4 I-
Pin 3:	CH4 V-
Pin 4:	CH5 V+
Pin 5:	CH5 I-
Pin 6:	CH5 V-
Pin 7:	CH6 V+
Pin 8:	CH6 I-
Pin 9:	CH6 V-
Pin 10:	CH7 V+
Pin 11	CH7 I-
Pin 12:	CH7 V-

Module power supply:
Supply voltage: 12 VDC +- 20 %
Power consumption: 80mA @ 12V.

Specification:

8 channels (differential configurable analog inputs), with 16 bit resolution is provided. Each channel can measure voltage or current.

Input ranges:

Voltage mode:	0 to 10V, 0 to 5V, -5V to +5V, -10V to +10V
Current mode:	0 to 20mA, -20mA to +20mA, 4mA to 20mA

Input impedance:

Voltage mode:	More than 1MΩ
Current mode:	125 Ohm ±0.1%

Effective resolution:	16 bit
ADC resolution:	24 bit
Update time:	30ms (for all channels)
Accuracy (at 25°C):	±0.1%
Nonlinearity:	± 0.001%
Temperature drift:	± 25ppm/°C
Common mode voltage:	Max. ±80V DC
CMRR:	Min. 80dB

Isolation:

Input to digital:	At least 1KV
Channel to channel:	At least 350V

Power Frequency noise rejection:

Default:	50Hz
Option:	60Hz

Digital Low-pass filter:
User configurable

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Ambient Temperature range:

Operating:	-20°C to +75°C
Storage:	-40°C to +85°C

Absolute maximum ratings*:

Voltage:	±40V DC
Current:	±40mA

* Note: Input signals exceeding the absolute maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.

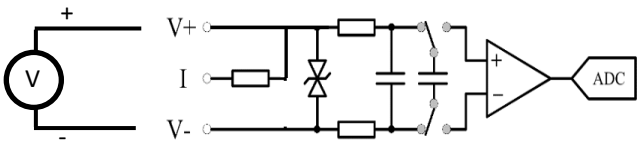
AI CIRCUIT CONFIGURATION

Configuration of each input channel

Input range selection:	web configuration
Digital filter configuring:	web configuration

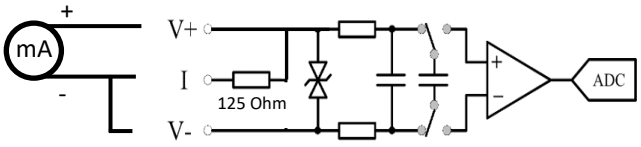
Input block diagram

Voltage Operation



Connect V+ and V-when using voltage input

Current Operation



Connect mA source ‘plus’ to V+ input and connect mA source ‘minus’ to both I and V- when using mA input. This allows the internal 125 ohm resistor to be added to the input circuit.

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AO02A
2ch Analog Outputs

This module provides 2x user configurable 16bit analog output channels.

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connectors for IO terminations. One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector A (upper):

Pin 1:	CH 0 Vout
Pin 2:	CH 0 common
Pin 3:	CH 0 Iout
Pin 4..6	Not used
Pin 7:	CH 1 Vout
Pin 8:	CH 1 common
Pin 9:	CH 1 Iout
Pin 10..12	Not used

Connector B (lower):

Pin 1..12	Not used.

Specification:

2 channels of sourced, configurable analog output with 16 bit resolution are provided. Each channel has voltage or current output (only one output type for each channel is selectable/active at a time). There is isolation between the analog output and other channels.

Electrical characteristics

Output ranges:

Voltage mode:	0 to 10V, 0 to 5V, -5V to +5V, -10V to +10V
Current mode:	0 to 20mA, 4mA to 20mA

Output load for voltage mode:

Max load current:	10mA
Short circuit current:	20mA (typ.)

Output load for current mode:

Max load impedance:	1KΩ
Open circuit detection:	Yes

Resolution:	16 bit
Accuracy (at 25°C):	±0.1%
Nonlinearity:	± 0.02%
Temperature drift:	± 25ppm/°C

Isolation:

Output to digital:	At least 1KV
Channel to channel:	At least 1KV

Ambient Temperature range:

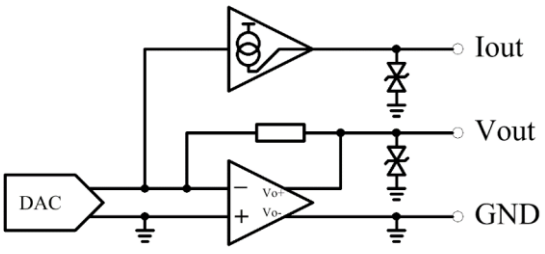
Operating:	-20°C to +75°C
Storage:	-40°C to +85°C

AO CIRCUIT CONFIGURATION

Configuration of AO channel
Only one of the 'Iout' or 'Vout' terminals must be used, according to desired output type (current or voltage).

The range of output is configured through web-based configurator and/or WorkSuite configuration. Details are provided in RTU User Guides.

Output block diagram



Module Power Requirements:
Power consumption: 200mA @ 12V.

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DI20A, DI20B
20ch Digital Inputs (12-24V, 30-60V)

This module provides 20x digital input channels (10-30VDC or 30-60VDC).

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):

Pin 1:	Common section A
Pin 2..11	Digital input 0 to 9 section A
Pin 12:	Common section A

Connector B (lower):

Pin 1:	Common section B
Pin 2..11	Digital input 10 to 19 section B
Pin 12:	Common section B

Specification:

20x bipolar optical isolated digital inputs for 12..24 or 48 VDC are provided. They are arranged in 2x sections of 10x inputs with 2 common terminals.

All Inputs provide software counters, with up to 100 Hz counting frequency @ 50% duty.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage A: Activated 10 - 30 VDC
Deactivated Max 3 VDC.

Input current A: Typical 3 mA @ 12 V,
Typical 6 mA @ 24 V

Input voltage B: Activated 30 - 60 VDC
Deactivated Max 8 VDC.

Input current B: Typical 4 mA @ 48 V

Input delay: 100 µs typical.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:
Power consumption: 25mA @ 12V.

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DI20C
20ch Digital/Counter Inputs (24V)

This module provides 18x digital input channels (10-30VDC) and 2x 5kHz (5-30VDC) counters. Counters can also be DI.

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):

Pin 1:	Common section A
Pin 2..9	Digital input 0 to 7 section A
Pin 10..11	Counter input 8 to 9 section A
Pin 12:	Common section A

Connector B (lower):

Pin 1:	Common section B
Pin 2..11	Digital input 10 to 19 section B
Pin 12:	Common section B

Specification:

18x bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in 2x sections of 10x inputs with 2 common terminals.

Inputs 0.. 7, 10-19 provide software counters, with up to 100 Hz counting frequency @ 50% duty.

2x counters (inputs 8 and 9) provide high speed hardware counters, with up to 5 KHz counting frequency @ 50% duty (5-30VDC operation).

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.
This could also be used in combination with software counters, in case a low frequency mechanical contact is used for counters.
Debounce filter setting has no effect on high speed counters.

DI Input voltage:

Input 0..7	Activated 10 - 30 VDC. Deactivated Max 3 VDC.
Input 10..19	Activated 10 - 30 VDC. Deactivated Max 3 VDC.
Input 8..9	Activated 5 - 30 VDC. Deactivated Max 2 VDC.

DI Input current:

Input 0-7/10-19	typical 2.5 mA @ 12 V
Input 0/10-19	typical 5 mA @ 24 V
Input 8-8	typical 4 mA @ 12 V
Input 8-9	typical 8 mA @ 24 V

DI Input delay:
100 µs typical.

High speed counters (inputs 8 and9):
Maximum frequency, 5KHz @ 10..30VDC input.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:
Power consumption: 25mA @ 12V.

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DI12H
12ch Digital Inputs (90-140V)

This module provides 12x digital input channels (90-140VDC) with ch-ch isolation.

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):
Pin 1: CH0 +
Pin 2: CH0 -

Pin 11: CH5 +
Pin 12: CH5 -

Connector B (lower):
Pin 1: CH6 +
Pin 2: CH6 -

Pin 11: CH11 +
Pin 12: CH11 -

Specification:

12x bipolar optical isolated digital inputs for 90-140 VDC are provided. They are arranged in 2x sections of 6x inputs with 2 terminals per channel.

All Inputs provide software counters, with up to 100 Hz counting frequency @ 50% duty.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage: Activated 90 - 140 VDC
Deactivated Max 25 VDC.

Input current: Typical 3 mA @ 110 VDC

Input delay: 100 µs typical.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:
Power consumption: 30mA @ 12V.

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DI12B
12ch Digital Inputs (30-60V)

This module provides 12x digital input channels (30-60VDC) with ch-ch isolation.

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):
Pin 1: CH0 +
Pin 2: CH0 -

Pin 11: CH5 +
Pin 12: CH5 -

Connector B (lower):
Pin 1: CH6 +
Pin 2: CH6 -

Pin 11: CH11 +
Pin 12: CH11 -

Specification:

12x bipolar optical isolated digital inputs for 30-60 VDC are provided. They are arranged in 2x sections of 6x inputs with 2 terminals per channel.

All Inputs provide software counters, with up to 100 Hz counting frequency @ 50% duty.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage: Activated 30 - 60 VDC
Deactivated Max 15 VDC.

Input current: Typical 3 mA @ 48 VDC

Input delay: 100 µs typical.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:
Power consumption: 30mA @ 12V.

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DO08R
8ch Relay Outputs (NC/C/NO)

This module provides 8x relay output channels (N.O. / Common / N.C.).

Connectors
2x 12 way 3.5mm Phoenix MC pluggable screw clamp connector for relay outputs.

One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector A:

Pin 1:	Relay output 0 NO.
Pin 2:	Relay output 0 Common
Pin 3:	Relay output 0 NC
Pin 4..6:	Relay output 1 NO/C/NC.
Pin 7..9:	Relay output 2 NO/C/NC.
Pin 10..12:	Relay output 3 NO/C/NC.

Connector B:

Pin 1..3:	Relay output 4 NO/C/NC.
Pin 4..6:	Relay output 5 NO/C/NC.
Pin 7..9:	Relay output 6 NO/C/NC.
Pin 10..12:	Relay output 7 NO/C/NC.

Specification:
8x mechanical non latching relay outputs, SPDT, are provided.

Load voltage:
Max 125 VDC.

Load current resistive:
0.25A @ 125VDC, 1.5A @48VDC, 2A @ 30VDC.

Output delay:
typical 5 ms.

Isolation:
2000 VAC output to electronics, 1 minute.

Ambient temperature range:
-25°C to +70°C

Module Power Requirements:
25mA @ 12V plus 10mA for each activated relay output.

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DO12R
12ch Relay Outputs (NO)

This module provides 12x relay output channels (N.O. contact pairs).

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for relay outputs.

One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector A:
Pin 1..2: Relay output 0 contact, NO.
Pin 3..4: Relay output 1 contact, NO.
Pin 5..6: Relay output 2 contact, NO.
Pin 7..8: Relay output 3 contact, NO.
Pin 9..10: Relay output 4 contact, NO.
Pin 10..11: Relay output 5 contact, NO.

Connector B:
Pin 1..2: Relay output 6 contact, NO.
Pin 3..4: Relay output 7 contact, NO.
Pin 5..6: Relay output 8 contact, NO.
Pin 7..8: Relay output 9 contact, NO.
Pin 9..10: Relay output 10 contact, NO.
Pin 10..11: Relay output 11 contact, NO.

Specification:
12x mechanical non latching relay outputs, SPST, are provided.

Relay output: potential free contact SPST (NO).

Load voltage:
Max 240 VAC, 125 VDC.

Load current resistive:
1 A @ 240VAC,
0.25A @ 125VDC, 2A @ 30VDC.

Output delay:
typical 5 mS.

Isolation:
2000 VAC output to electronics, 1 minute.

Ambient temperature range:
-25°C to +70°C

Module Power Requirements:
25mA @ 12V plus 10mA for each activated relay output.

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DO20A
20ch Digital Outputs

This module provides 20x digital output channels (smart high side switch, 10..30 VDC).

Connectors
2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector A (upper):
Pin 1: Vin + section A
Pin 2..11 Digital output 0 to 9 section A
Pin 12: Vin - section A

Connector B (lower):
Pin 1: Vin + section B
Pin 2..11 Digital output 10 to 19 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:
Power consumption: 30mA @ 12V.

Digital Outputs.
20 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in two sections of 10 outputs. The sections are isolated from each other and electronics.

External feed voltage:	10 – 30 VDC
Output current:	Max 0.5A, max 2A per section (10 outputs)
Output delay:	1ms (max.)
On resistance:	160mΩ (typ.)
Output leakage current:	7µA (max. in off state)

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DM20A
Combination 10ch DI + 10ch DO

This module provides 10x digital input channels (10-30VDC) and 10x digital output channels (smart high side switch, 10..30 VDC).

Connectors
1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):
Pin 1: Common section A
Pin 2..11 Digital input 0 to 9 section A
Pin 12: Common section A

Connector B (lower):
Pin 1: Vin + section B
Pin 2..11 Digital output 0 to 9 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:
Power consumption: 30mA @ 12V.

Digital Inputs
10 bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in two sections of 10 inputs, with 2 common terminals a section. Each section is isolated from each other and electronics.

Input 0.. 7 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage: Activated 10 - 30 VDC
Deactivated Max 3 VDC.

Input current: Typical 3 mA @ 12 V,
Typical 6 mA @ 24 V

Input delay: 100 µs typical.

Digital Outputs
10 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in one section of 10 outputs. The section is isolated from each other and electronics.

External feed voltage: 10 – 30 VDC

Output current: Max 0.5A, max 2A per section (10 outputs)

Output delay: 1ms (max.)
On resistance: 160mΩ (typ.)
Output leakage current: 7µA (max. in off state)

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DM20C
Comb. 8ch DI + 2ch Ctr + 10ch DO

This module provides 8x digital input channels (10-30VDC), 2x 5kHz (5-30VDC) counters and 10x digital output channels (smart high side switch, 10..30 VDC). Counters can also be DI.

Connectors
1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs/Counters.

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):
Pin 1: Common section A
Pin 2..9 Digital input 0 to 7 section A
Pin 10..11 Counter input 8 to 9 section A
Pin 12: Common section A

Connector B (lower):
Pin 1: Vin + section B
Pin 2..11 Digital output 0 to 9 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:
Power consumption: 30mA @ 12V.

Digital Inputs
10 bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in two sections of 10 inputs, with 2 common terminals a section. Each section is isolated from each other and electronics.

Input 0.. 7 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

DI Input voltage:
Input 0..7 Activated 10 - 30 VDC.
Deactivated Max 3 VDC.

Input 8..9 Activated 5 - 30 VDC.
Deactivated Max 2 VDC.

DI Input current:
Input 0-7 typical 2.5 mA @ 12 V
Input 0-7 typical 5 mA @ 24 V
Input 8-9 typical 4 mA @ 12 V
Input 8-9 typical 8 mA @ 24 V

Input delay: 100 µs typical.

Digital Output.
10 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in one section of 10 outputs. The section is isolated from each other and electronics.

External feed voltage: 10 – 30 VDC

Output current: Max 0.5A, max 2A per section (10 outputs)

Output delay: 1ms (max.)
On resistance: 160mΩ (typ.)
Output leakage current: 7µA (max. in off state)

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IO14A / IO14B
Comb. 3 AI + 1 AO + 8 DI + 2 DO

This module provides 3x analog input channels (A has current inputs, B has voltage inputs), 1x analog output channel (current), 8x digital input channels (10-30VDC – includes 2x 5kHz counters and 2x relay output channels. Counters can also be DI.

Connectors
2x 12 way 3.5mm Phoenix MC pluggable screw clamp connector for IO connections.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):

Pin 1:	DO0 N.O.
Pin 2:	DO0 Common
Pin 3:	DO0 N.C.
Pin 4:	DO1 N.O.
Pin 5:	DO1 Common
Pin 6:	DO1 N.C.
Pin 7:	AI0 +
Pin 8:	AI0 -
Pin 9:	AI1 +
Pin 10:	AI1 -
Pin 11:	AI2 +
Pin 12:	AI2 -

Connector B (lower):

Pin 1:	DI Common
Pin 2.. 9:	DI0 – DI7
Pin 10:	AO0 Vin +
Pin 11:	AO0 Iout
Pin 12:	AO0 Vin -

Ambient temp. range: -25°C to +70°C

Module Power Requirements:
Power consumption: 100mA @ 12V.

Analog Inputs

3 channels (differential analog inputs), with 16 bit resolution is provided. IO14A channels can measure current, IO14B channels can measure voltage.

Module Firmware Version < 1.1.2.1
Type A Current mode: 0/4mA to 20mA
Type B Voltage mode: 0/1to 5V
Module Firmware Version = 1.1.2.2
Type A Current mode: 0/3.5mA to 20.5mA
Type B Voltage mode: 0/0.875 to 5.125V
Module Firmware Version > 1.1.2.4
Type A Current mode: 0/3.5mA to 20/20.5mA
Type B Voltage mode: 0/0.875 to 5/5.125V

Current impedance:	250 Ohm ±0.1%
Voltage impedance:	More than 1MΩ
Effective resolution:	16 bit
ADC resolution:	24 bit
Update time:	10ms (for 3 channels)
Accuracy (at 25°C):	±0.1%
Isolation:	At least 1KV (1 min.)

NOTE: The input range has been extended from standard 4-20mA/1-5V in module firmware version 1.1.2.2 onward. Firmware version 1.1.2.4 allows selection between standard and extended in Worksuite (Worksuite version 1.65.5.1280 and up ONLY).

Analog Output

1 channel of analog output with 16 bit resolution is provided. The channel has a current output and requires 10-30VDC field power.

Output range:	0/4 to 20mA
Max load impedance:	1KΩ
Resolution:	16 bit
Accuracy (at 25°C):	±0.1%
Isolation:	At least 1KV

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Relay Outputs

2 mechanical non latching relay outputs, SPDT, are provided.

Load voltage:	Max 125 VDC
Load current resistive:	0.25A @ 125VDC, 2A @ 30VDC
Output delay:	5ms (typical)
Output isolation:	2KV (1 minute)

Digital Inputs

8 bipolar optical isolated digital inputs for 12..24VDC are provided. Inputs are isolated from each other and electronics.

Inputs 0.. 5 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle. Inputs 6 and 7 will provide high speed hardware counters, with up to 5kHz counting frequency at 50% duty cycle.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

DI Input voltage:

Input 0..5	Activated 10 - 30 VDC. Deactivated Max 3 VDC.
Input 6..7	Activated 5 - 30 VDC. Deactivated Max 2 VDC.

DI Input current:

Input 0-5	typical 2.5 mA @ 12 V
Input 0-5	typical 5 mA @ 24 V
Input 6-7	typical 4 mA @ 12 V
Input 6-7	typical 8 mA @ 24 V

Input delay:	100 µs typical.
Counters (DI 6-7)	Up to 5kHz @10-30VDC
Isolation:	2KV (1 minute)

Absolute maximum ratings*:

Analog input current (type A): ±30mA
Analog input voltage (type B): ±40VDC
Analog output power (Vin+): ±35VDC
Digital Input voltage: ±40VDC

* Note: Exceeding the absolute maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.

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EMC, Safety and Environmental

EMC: IEC 61000-6-2, IEC 61000-6-4
Safety Requirements: IEC 60950-1

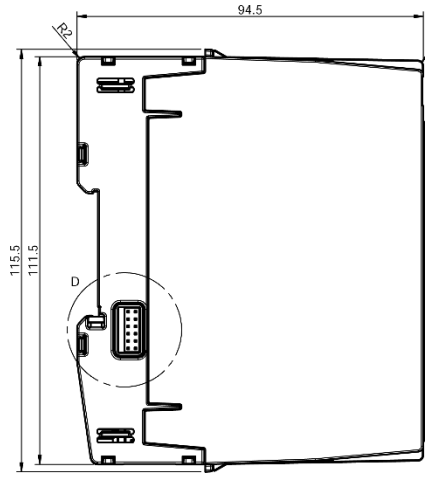
Climatic:
- Damp Heat: IEC 60068-2-30
- Damp Heat Steady: IEC 60086-2-3
- Dry Heat: IEC 60086-2-2

Mechanical:
- Vibration: IEC 60255-21-1
- Shock: IEC 60068-2-27
- Shock and Bump Test: IEC 60255-21-2

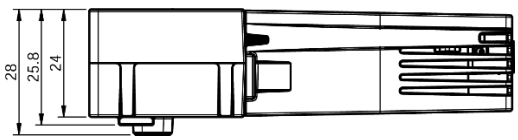
Maximum frequency, 5KHz @ 10..30VDC input.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Dimensions



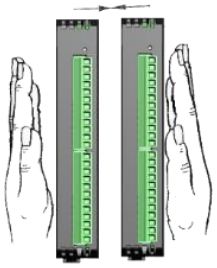
Backplane & I/O module side view



Backplane & I/O module top view

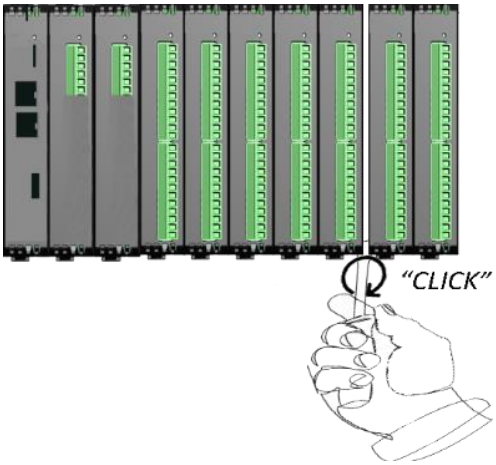
Assembling BUS and I/O modules

Backplane modules are assembled by gently pressing them together with hands, no tools needed.



Separating modules

If two backplane modules need to be separated, use a flathead screwdriver. Push it in between the backplane modules and rotate it gently to allow the modules to be pulled apart.



Module LED Status Information

Dual colour LEDs on the module indicate status:

State	Yellow	Red
Normal operation	ON	OFF
USB bus Suspended	OFF	ON
Not configured	ON	ON
No power / HW error	OFF	OFF

Further information about the LB2 Series IO modules can be found in the Brodersen LB2 User Manual.

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